Comparative Transcriptome Analysis of Human Trophectoderm and Embryonic Stem Cell-Derived Trophoblasts Reveal Key Participants in Early Implantation.

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Public Summary:
The implantation process begins with attachment of the trophectoderm (TE) of the blastocyst to the maternal endometrial epithelium. Herein we have investigated the transcriptome of mural TE cells from 13 human blastocysts and compared these with those of human embryonic stem cell (hESC)-derived-TE (hESC(troph)). The transcriptomes of hESC(troph) at Days 8, 10, and 12 had the greatest consistency with TE. Among genes coding for secreted proteins of the TE of human blastocysts and of hESC(troph) are several molecules known to be involved in the implantation process as well as novel ones, such as CXCL12, HBEGF, inhibin A, DKK3, WNT5A, follistatin. The similarities between the two lineages underscore some of the known mechanisms and offer discovery of new mechanisms and players in the process of the very early stages of human implantation. We propose that the hESC(troph) is a viable functional model of human trophoblasts to study trophoblast-endometrial interactions. Furthermore, the data derived herein offer the promise of novel diagnostics and therapeutics aimed at practical challenges in human infertility and pregnancy disorders associated with abnormal embryonic implantation.

Scientific Abstract:
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